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NEWSLETTER

HEGGEL® PL 620

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Ensuring Reliability in Copper Smelting Complexes

> Copper Production Complexes: Transforming Ore and Gas into Value

Modern copper production complexes are dynamic, integrated systems that extract maximum value from every ton of ore. The process begins in the concentrator, where ore is upgraded to copper concentrate. In the smelter, this concentrate is melted at approximately 1,200 °C, producing blister copper and releasing SO_2-rich off-gas. Rather than allowing this gas to escape, it is captured and routed to the sulfuric acid plant, where it is transformed into high-purity sulfuric acid (H_2SO_4) – a valuable by-product essential to numerous industrial and metallurgical processes. Finally, the refinery purifies blister copper into the final refined 99.99% copper product.

Throughout these stages, reliable coatings and linings protect steel and concrete structures, ensuring efficient operation, low maintenance, and environmental compliance.

The Sulfuric Acid Plant – Function, Conditions and Corrosive Environment

During copper smelting, sulfur in the concentrate oxidizes to sulfur dioxide (SO_2). Inside the sulfuric acid plant, this gas is cooled, cleaned, and converted into sulfur trioxide (SO_3) by catalytic oxidation before being absorbed in circulating acid to form concentrated H_2SO_4.

The process environment, however, is extremely aggressive. Drying towers operate high concentrations of acid at 60–80 °C, absorption towers handle hot oxidizing gases, and gas ducts carry SO_2/SO_3 mixtures at temperatures up to 300 °C. Sumps, dilution pits, and drainage channels frequently contain sulfuric acid concentrations up to 80%, where corrosion is most severe. These zones, such as tower bottoms and collection pits, require reliable acid-resistant materials to prevent leaks and preserve structural integrity.

To manage these conditions, all process equipment is internally protected with robust acid-resistant coatings and tile or brick lining systems. High-performance mortars protect the substrate from acid attack and maintain containment integrity. With properly engineered linings, towers, ducts, and tanks deliver long periods of safe and efficient operation.

Reliability Under Pressure

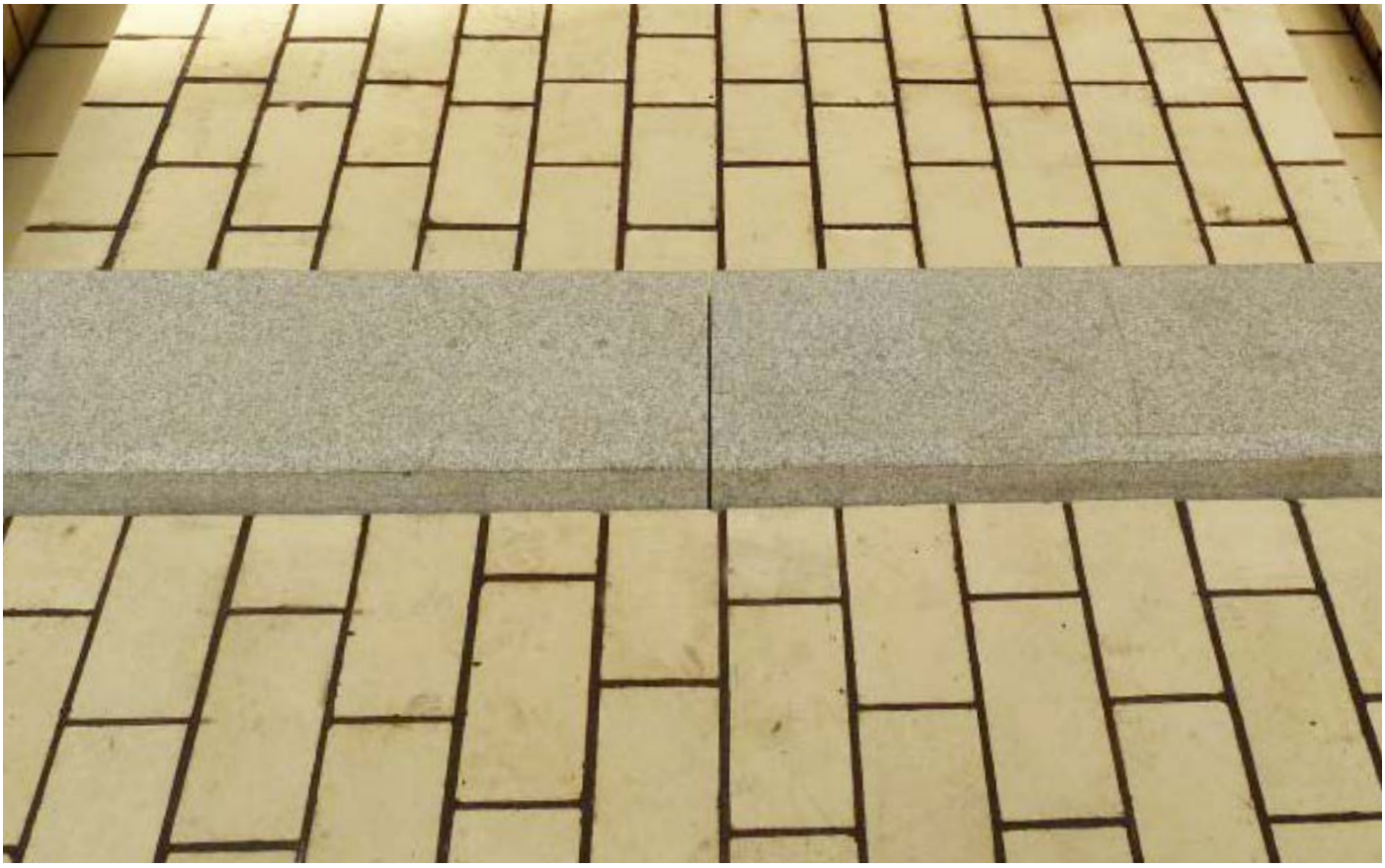
In sulfuric acid plants, concrete structures such as sumps, neutralization pits, collection channels, and foundations are constantly challenged by chemical and thermal stress. When left unprotected, concrete rapidly deteriorates under exposure to even moderately concentrated sulfuric acid. The reaction between acid and the alkaline components of cement produces gypsum and ettringite, leading to surface softening, cracking, and progressive loss of structural integrity. Acid-laden condensate or diluted process acid easily penetrates through microcracks and joints, attacking embedded reinforcement and accelerating corrosion from within. In severe cases, concrete delamination and spalling occur, resulting in safety risks, leakage, and expensive structural rehabilitation. Even minor acid seepage can undermine equipment bases, destabilize pipe supports, and create hazardous maintenance conditions. To prevent this kind of damage, modern lining systems are applied to act as a dense, chemically resistant barrier between the process environment and the structural substrate. A well-selected mortar or coating eliminates the pathways for acid infiltration, maintaining both mechanical strength and watertight integrity over years of continuous service.

The Value of Protective Linings

Protective linings are the first line of defense against corrosion and structural decay. In sulfuric acid environments, phenolic resin -based mortars with tile or brick linings and a phenolic resin-based membrane layer have proven to be the most durable and reliable choice for long-term protection. They combine high chemical resistance with mechanical strength, forming an impermeable shield that prevents acid from reaching the concrete or steel beneath.

These systems maintain their stability under continuous exposure to hot acids and oxidizing gases, while accommodating the thermal expansion of brick linings without cracking. In concrete applications, such as sumps, pump foundations, or collection trenches, phenol mortars create seamless protection that resists chemical attack.

By isolating structural materials from aggressive media, these advanced mortar systems ensure integrity, operational safety, and extended service life. When properly engineered and installed, they enable structures to perform reliably for decades, minimizing unplanned maintenance and ensuring efficient, sustainable plant operation.



HEGGEL PL 620 – Synthetic Phenolic Mortar for Harsh Acid Conditions

To meet the extreme service conditions in copper-smelter acid plants, **HEGGEL GmbH** recommends **HEGGEL PL 620**, a two-component synthetic phenolic-resin based mortar filled with conductive carbon. It is designed as the bedding and jointing mortar for complete acid-resistant lining systems with combination of **HEGGEL FRP 320** as the membrane layer with **HEGGEL UltraTile** or **HEGGEL ProBrick** as the protective tile and brick linings.

HEGGEL FRP 320 forms a seamless, chemically resistant membrane that isolates the substrate, while **HEGGEL UltraTile** and **HEGGEL ProBrick** provide mechanical strength and abrasion resistance. **HEGGEL PL 620** bonds these layers into a monolithic, acid-resistant structure that combines mechanical strength, chemical resistance, and thermal stability into one cohesive system.

Key Features of the HEGGEL Tile and Phenolic Mortar System:

- **Outstanding chemical resistance:** Resists strong mineral and organic acids, hydrocarbons, oils, and solvents.
- **High mechanical durability:** Withstands heavy loads, abrasion, and thermal cycling without loss of integrity.
- **Total impermeability:** The membrane layer prevents acid migration and under-film corrosion.
- **Excellent adhesion and dimensional stability:** Maintains tight bonding between layers for long-term reliability.
- **Controlled electrical conductivity:** Ensures safe dissipation of static charges in dry-gas or high-temperature zones.
- **Leak-tight, prestressed brickwork:** Slight thermal expansion during curing forms a compact, pressure-sealed lining.

Technical Specifications of HEGGEL PL 620

Property	Test Standard	Value	Unit
Density	DIN EN ISO 1183-1	1.5	g/cm³
Compressive Strength	DIN EN ISO 604	65	MPa
Flexural Strength	DIN EN ISO 178	24	MPa
Tensile Strength	DIN EN ISO 527	8.5	MPa
Adhesion Strength	DIN EN ISO 4624	≥ Inherent tensile strength	–
Shore D Hardness	DIN 53505	70	Shore D

Its high compressive and flexural strength ensure robust structural integrity, while excellent adhesion guarantees lasting bond performance with ceramic and carbon brick. Together with the impermeability of **HEGGEL FRP 320** and the durability of **HEGGEL UltraTile** or **HEGGEL ProBrick**, the system delivers long-term reliability, safety, and extended service life in the harshest acid-plant operating conditions.

Ensuring Long-Term Reliability

The reliability of a sulfuric-acid plant depends on the durability of its linings and mortars. The robust chemical and mechanical properties of **HEGGEL PL 620** deliver consistent performance, minimizing corrosion risks and unplanned maintenance. Its proven ability to withstand aggressive acid exposure, high temperatures, and mechanical stress ensures lasting containment integrity and safety in the most critical zones.
As part of a complete **HEGGEL** corrosion-protection system, **HEGGEL PL 620** enables copper smelters to operate safely and sustainably, protecting infrastructure, preserving uptime, and ensuring continuous production for years to come.

Strengthen Your Project with HEGGEL

Our specialists provide on-site inspections, corrosion analysis, and complete lining-system design tailored to your operating conditions.

Click here to contact our team and discover how our expertise can enhance your project durability.

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